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United States Patent [19]**Danyluk et al.**[11] **Patent Number:** **5,974,869**[45] **Date of Patent:** **Nov. 2, 1999**[54] **NON-VIBRATING CAPACITANCE PROBE
FOR WEAR MONITORING**[75] Inventors: **Steven Danyluk**, Atlanta, Ga.; **Anatoly Zharin**, Minsk, Belarus; **Elmer Zanoria**, Oak Ridge, Tenn.; **Lennox Reid**, Houston, Tex.; **Kenneth M. Hamall**, Peachtree City, Ga.[73] Assignee: **Georgia Tech Research Corp.**, Atlanta, Ga.[21] Appl. No.: **08/971,101**[22] Filed: **Nov. 14, 1997****Related U.S. Application Data**

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[51] Int. Cl.⁶ **G01R 27/26**[52] U.S. Cl. **73/105; 73/104; 324/458;
324/663; 324/686**[58] Field of Search **73/104, 105; 324/663,
324/686, 690, 457, 458**[56] **References Cited****U.S. PATENT DOCUMENTS**

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Primary Examiner—Daniel S. Larkin*Attorney, Agent, or Firm*—Deveau, Colton & Marquis[57] **ABSTRACT**

A non-vibrating capacitance probe for use as a non-contact sensor for tribological wear on a component. The device detects surface charge through temporal variation in the work function of a material. A reference electrode senses changing contact potential difference over the component surface, owing to compositional variation on the surface. Temporal variation in the contact potential difference induces a current through an electrical connection. This current is amplified and converted to a voltage signal by an electronic circuit with an operational amplifier.

10 Claims, 13 Drawing Sheets